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ABSTRACT

This document is one of five manuals designed to improve management practices in Ohio two-year colleges. The guidelines and criteria presented here are intended to be used as yardsticks for institutional evaluation of student registration and class scheduling practices. A chapter on the planning process discusses the steps to be taken in planning, definitions of terms, outputs expected, goals, and objectives. A chapter on schedule preparation discusses criteria for curriculum and cost evaluations, and outlines methods of determining the numbers of class sections and day and time assignments, and of determining who should be involved in such decision-making. A chapter on space scheduling discusses who is responsible for assigning classrooms, what process should be used, how to settle disputes, when assignments must be made, when to notify students and faculty, and how best to utilize space. A chapter on registration systems provides general guidelines for advance, open, and late registration. The final chapter discusses data needs and data processing methods, the use of commercially developed computer-based registration and scheduling systems, and on-line computer registration techniques. A flow chart of a card-oriented registration system for a small college is appended. (DC)

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SCHEDULE BUILDING AND STUDENT REGISTRATION

Two Year Colleges

Management Improvement Program

Ohio Board of Regents

MIP

Prepared by a task force of two year college representatives with direction and staff assistance provided by the Ohio Board of Regents

July 1, 1973

JC 750 369

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Foreword

This manual is one of ten completed in the Management Improvement Program(MIP) during the 1971-73 biennium. In this project, Ohio's 34 public universities and colleges, in an effort directed and staffed by the Ohio Board of Regents, have developed manuals of management practices concerning institutional planning, program budgeting, personnel management, computer services, and schedule building and registration. The project is unique in at least two ways—the improvement of internal management processes is the objective of the program, and the method of undertaking it was mandated by the Ohio General Assembly to be participatory.

House Bill 475, the appropriation act passed by the 109th General Assembly in December, 1971, created the MIP, directing that it be conducted by and within the system of state-assisted universities and colleges under the direction of the Ohio Board of Regents. This legislative action culminated more than four years of active interest by the legislators in improving the management practices of these schools.

In 1967, a joint House-Senate committee, called the Education Review Committee, was created by the General Assembly. Included in its charge was that of monitoring the management practices of the public universities in Ohio. This committee, in conjunction with the Department of Finance, hired a management consulting firm to perform a management study of the nonacademic areas of the 12 public universities and of the state system as a whole. The report of the consultants, published in December, 1969, made about 100 specific recommendations for management improvement. The Education Review Committee remained interested in appropriate follow-up of the study. With the aid of another individual consultant, language was introduced in the General Assembly which was included in the appropriation for the biennium. Some excerpts of the actual language are as follows:

> "The purpose—shall be to design, test, and install, in each such institution, the most efficient feasible internal organization, planning process, financial management, budget preparation and management, auxiliary services management, space management and plant operation, purchasing procedures and inventory control procedures, student data systems including admission procedures and student registration procedures, management reporting systems, data processing, personnel management, and library management.
>
> Each project is to be conducted in cooperation with a committee of representatives from state-assisted colleges and universities.
>
> The director of each project is to be a staff specialist in the employ of the Board of Regents.
>
> For guidance in the conduct of each Management Improvement Project, the participants are to consult the findings as set forth in the 1969 Consultant's Report."

Primarily because the appropriation to carry out the program was not commensurate with the depth and breadth of the tasks spelled out in House Bill 475, the scope of the Management Improvement Program in this biennium

was restricted to five central areas (Institutional Planning, Program Budgeting, Computer Services, Schedule Building and Registration, and Personnel Management). In addition, the original mandate of H.B. 475 was "to design, test and install the most efficient, feasible procedures" in each of the areas in each of the institutions. Because of the limited time, only 18 months, and the participatory method of undertaking the project prescribed in the bill, the immediate objective set forth in the past biennium was the generation of a manual of best practices in each of the five areas.

As stipulated by the legislature, task forces of institutional representatives were appointed and actively participated in the process. Ten such groups were formed; five for the universities and five for the community and technical colleges. Each task force consisted of representatives qualified in the particular subject matter under study. Each group had at least one member from every school. In total, more than 175 college and university personnel from all over the state were directly involved, as well as many others at each institution through fromal and informal contact with the appointed members. Each task force met 8-10 times in the year and a half devoted to the project.

As specified in the legislative bill, the Ohio Board of Regents provided direction and staff for the project. Four professional management analysts, two secretaries, and limited part-time analytical and clerical help constituted the manpower to fulfill that charge.

Three major phases constituted the project:

1. **Inventory the current practices.**
   This phase involved compiling the existing practices and procedures in the five areas at each state-assisted school in Ohio. Approximately five months were devoted to this task.
2. **Determine the issues to be addressed in the manuals.**
   Three months were devoted to discussions about the specific issues to be covered.
3. **Write manuals.**
   Nine months were devoted to writing the manuals. This phase included extensive and detailed discussions by the task forces, much drafting and redrafting by the staff and task force members, and finally concurrence with the manual contents.

The manuals are practical, informative and useful. For the most part, all of the manuals contain general guidelines, principles and broad recommendations for good management within the universities and colleges, rather than detailed and specific procedures. They also include recommendations which call for direct action by the Board of Regents. Basically, the recommendations seek more effective internal management and accountability, while recognizing the autonomy of each school.

Literally hundreds of people have been involved in this project. All members of the Ohio Board of Regents staff, especially former Chancellor John Millett, and Vice Chancellor William Coulter, have made significant contribu-

tions to the entire project. The Regents were particularly fortunate in gathering together the staff for the MIP. Dr. Ronald Lykins, Mr. Lawrence J. O'Brien, Mr. Douglas Smith, and Dr. Joseph Tucker brought with them considerable experience and knowledge from administrative and academic aspects of colleges and universities, as well as from private industry. Their perseverance and leadership in directing and staffing the task forces were superb. Special thanks must be given to Mrs. Betty Dials, the secretary for the program, who was an inspiration to all.

Many agencies in other states, including colleges, universities and state systems, were contacted and in some cases contributed helpful data to the program. Applicable professional organizations were also contacted and did help.

But more than any other, however, the contributions made by the individual task force members must be mentioned and expanded upon. The more than 175 personnel from the 34 colleges and universities who were the official representatives for their schools contributed long hours, data, ideas, constructive criticisms, changes, and encouragement. They not only worked collectively in the task forces, but also were required to spend considerable time on the respective campuses gathering data together and communicating with many campus constituencies to make sure that their schools were fairly and adequately represented.

The two-year college schedule building and student registration task force members were:

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Without their sincere participation, this manual would not exist.

Gerald L. Shawhan, Director
Management Improvement Program

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SCHEDULE BUILDING AND STUDENT REGISTRATION

Two Year Colleges

1. Introduction

Role of Student Registration and Class Scheduling (SRCS) in Higher Education

This manual is concerned in general with the process by which courses within curricula are planned, a schedule of courses developed, students choose or are assigned to courses, and finally the confirmation of such assignment through fee payment. This process is a fundamental operational aspect of every college and university. It is vital to the American system of higher education. Nearly all faculty members, all students, a large percentage of both academic and nonacademic administrators, and considerable support staff and time are expended in this overall process. Many forms, support from computers, and likewise many frustrations usually accompany the process. Literally thousands of individual decisions are made during this process which affect in one way or another the entire faculty and student bodies. The process takes place in its entirety at least four times a year for public two-year colleges in Ohio (all schools follow the Quarter Calendar).

SRCS Process

The SRCS process as practiced on campuses across the country has nearly an infinite number of varieties and descriptions. Yet it is possible to group the events into the following three step format which is valid for all schools.

Schedule Building

The first major segment of SRCS involves the development of academic courses and the detailed schedule of those courses both yearly and quarterly. This portion of the process primarily involves effort and decisions by the department chairmen and dean of instruction or vice president for academic affairs. Considerable help is supplied by others, however. The specific courses to be offered, numbers of sections, methods of teaching, faculty assignments, days and times to offer sections, and the classroom and laboratory assignments are all facets involved in this portion.

Registration Systems

The second major segment of SRCS involves the matching up of students and their program needs with the schedule of courses developed as described

above. This segment usually involves heavy input from the departments at the start of the process and considerable effort by the nonacademic officers such as registrars, controllers and cashiers as the process continues. Involved are such items as student selection of specific courses, more often than not involving faculty or other academic advisors. The actual assignment of students to specific sections with feasible time schedules, and the confirmation of these assignments through fee assessments and collections are also extremely important and vital parts of the process. Normally, this process can be further segmented by time parameters. Most schools have three systems or sets of procedures; one is called advance registration. This is the process which takes place weeks or months before the actual start of a school term. The second, open registration, is the process involving the same facets but with possibly different procedures. It occurs just **prior** to the start of a term. Finally, late registration considers the procedures usually enforced for the process when it occurs after the start of a term.

Registration Changes

The third major segment involves those procedures necessary to handle changes in completed registrations. The dropping and adding of courses, withdrawals from schools during a term, refunds, and added fees are some of the specific items of concern. Usually both the teaching faculty, as well as the nonacademic offices, are involved.

Purpose of Manual

It is a clear intention that all public colleges in Ohio improve their individual SRCS management processes and raise their levels of accountability by using this manual. Thus, the system of schools in Ohio can show measurable overall management improvement and help earn greater public confidence and support. What is the purpose of this manual then that it may be followed in such a manner?

The overall purposes of this manual is to document specific recommendations for desirable management practices in each of the areas of student registration and class scheduling. The intent is to make the manual useful for the various institutions in their quest to improve their own management practices. These changes with regard to the practices described in the manual may come about at a time when institutions are already planning a change in their practice or procedure and thus, the manual can provide direction. Changes regarding the recommended practices may be initiated after a self-comparison by an institution after being made aware of a recommended practice that has been used successfully in another institution. This situation will be true in the case of assisting the less experienced institutions to study and possibly implement the methods of the more experienced and the better equipped schools.

Another purpose afforded by the manual is the availability to the institutions of a yardstick that can be used to measure their own performance. The guidelines or criteria presented in the various areas will enable the institutions to judge how well they are utilizing the resources available for student

registration and class scheduling on their campus. An attempt has been made to provide quantitative criteria wherever possible. Where this was not feasible, guidelines of a qualitative nature are included to assist the user.

A third purpose of the SRCS manual can be described as educational in that an attempt was made to provide a logical and organized discussion of the student registration and class scheduling process. This discussion should be of value to a broad spectrum of administrators and faculty on the campus as well as its intended audience; namely, those directly responsible for the registration and scheduling process.

Although not a stated purpose of the manual, a result of the participatory process followed in developing the manual will, by itself, help to improve the registration and scheduling process in the various institutions. That is to say, the task force formed to work in conjunction with the Board of Regents staff has caused the various institutions to become more aware of what each is doing and to facilitate an exchange of information. This information exchange is a first step in the overall process of increased inter-institutional cooperation in the SRCS area.

In summary, the stated purposes of the manual can be categorized as follows:

1. To provide a means of sharing the effective registration and scheduling practices that have been developed at different institutions.
2. To provide practical and useful ideas which can be used to improve SRCS practices at the individual institutions.
3. To provide some criteria and guidelines which can be utilized by individual institutions to evaluate their present processes.
4. To provide planners and administrators, as well as other interested parties, a logical and organized discussion of the process of student registration and class scheduling.

Disclaimers

In order to better understand the intended use of this manual, it may be helpful to discuss that which the manual does not purport to accomplish.

1. The manual does not state the one best practice for many of the areas, simply because it is impossible to define a best practice in those areas. In coming to a determination of best, there are typically different indices of performance that may be minimized or maximized (i.e., are we trying to minimize cost or maximize performance or maximize service or minimize time, etc.). In addition, the resources available will also affect determination of best, in that the resource level can constrain the possible approaches. Therefore, wherever a practice was considered best for the entire spectrum of institutions it was recommended. Otherwise, a number of recommended practices or guidelines are included.
2. The manual is not intended to be a rule book. It cannot be followed blindly, thus decreasing the number of decisions to be made.
3. Uniformity for uniformity sake was not pushed. Where uniformity would result in an increase in effectiveness, it is recommended. However, the real and significant difference between institutions,

in emphasis, organization, size, environment, etc. were recognized and taken into account.

4. Recommended practices and guidelines were generally agreed to by the participants, but this does not indicate there was unanimous agreement on all issues.

SRCS in Relation to the Management Improvement Program

As described in the foreword, the Management Improvement Program received its charge from the Legislature of the State of Ohio. The enacting bill used the following language which describes not only the breadth of the project, but also its charge to do much more than just study:

> The purpose of this Management Improvement Program shall be to design, test, and install in each institution, the most efficient feasible internal organization, planning process, financial management, budget preparation and management, auxiliary services management, space management and plant operation, purchasing procedures, student data systems including admissions procedures and student registration procedures, management reporting systems, data processing, personnel management, and library management.

Because of the staffing budget provided, only five key areas of management improvement have been worked on in the current biennium. These are institutional planning, program budgeting, personnel management, data processing, and student registration and class scheduling. These five areas were carefully selected and the systems described in these manuals are closely related. The five are fundamental management processes necessary for the proper operation of higher education institutions.

Institutional planning deals with a planning process encompassing the instructional, research and public service objectives of institutions, as well as the resources required to carry out such objectives; faculty and staff resources, physical plant resources, auxiliary services, etc. The planning manual, as with all the manuals, concerns itself with sound processes of management.

Program budgeting defines budgeting processes that focus attention on programs which logically seek to carry out the goals and objectives of the institution. These programs have output expectations against which progress can be measured, and are logical activities to which resources can be dedicated and against which costs can be identified.

Personnel management is concerned with the effective management of the academic and nonacademic personnel resources of a university or college. This facet is of critical importance because, as in any service industry, the human resources overwhelm all other resources in productive potential and in operational cost. Faculty in particular are the core of an educational institution.

In the field of data processing, the computer services manual is concerned with processes which will assure the availability of adequate computer services. This availability is integral not only to the modern management planning and reporting practices to which these services are essential, but

also to the growing demands of instruction and research at the college.

Finally, this manual is concerned with SRCS. This encompasses the efficient registration of students for individual courses which meet their particular educational needs. It also is concerned with the scheduling of classes in a way which most effectively utilizes college resources. This phase is central to carrying out the instructional objectives identified by an institution.

The five topical manuals then have been so structured on the one hand to avoid gross duplication, but on the other to form a cohesive, compatible set of recommended practices and guidelines which together encompass a major portion of higher education management. Where duplication exists, it was done to make any one of the five a compact, complete document. Even in such situations, however, readers will find a particular subject covered in detail in only one.

2. Planning Process

Introduction to General Planning Process

Insofar as the Management Improvement Program in an overall sense is concerned with all management practices in our public institutions of higher education, this chapter will concentrate on one of the central areas of management, planning, — described by many as a continuous, dynamic process in which projections help guide actions whose results feed back revisions into the projections. This planning process, the foundation of any effective management, is applicable to student registration and class scheduling as well as other functional areas in higher education.

The planning process is characterized in this manual by a systematic consideration of goals and objectives, identification of alternate series of activities (programs) to achieve the goals and objectives, analysis of alternatives, determination of best programs, allocation of resources to those best programs, and evaluation of results.

Planning is not the prediction of future events. It is only today's anticipations of that which is most likely to occur. The realization that all planning is largely an educated guessing game encourages preparation for contingencies, identification of alternatives and estimation of the probabilities of various possibilities. Planning must therefore be a continuous activity, not a periodic one.

Steps in the Planning Process

The planning process is defined as a management process that attempts to predetermine a course of action. The process is both cyclic and iterative and calls for each organizational unit in an educational institution to accomplish the following steps:

1. Establish **goals and objectives**
2. Determine **alternative programs** to achieve objectives
3. **Calculate resource requirements** for programs
4. **Determine priorities** of programs
5. **Allocate resources** to highest priority programs
6. **Evaluate** program progress

Definitions of Terms in Process

Definitions of the key terms used above are summarized here:

Goals — the desired end result set for a program — generally set for a long period of time (i.e., 5-10 years). Goals and objectives are often used interchangeably, but they differ with regard to time frame, sequence and measurability. Goals are long-range and generally considered the end result. Objectives are short-range and are steps in the

direction of attaining a goal.

Objectives — the measurable attainments or desired results set for programs over a short period of time (i.e., one year). Objectives are generally considered progressive steps toward a goal. Thus, a series of objectives should lead to one's goal.

An objective should be **written**, and should meet the following requirements:

1. It must relate to a goal
2. Be measurable or observable
3. Specify the method of measurement and criteria for evaluation
4. State the time period for achievement

Programs — a group of related activities used to achieve a goal or objective.

Alternatives — collection of different programs to accomplish the same objectives or goals

Resources — personnel, space, operating support services and equipment which are converted into dollars and cents.

Priorities — establishing the relative importance of specific activities

Allocating — subdivide, schedule and assign the available resources between different activities.

Evaluating — a systematic process for determining or estimating the effectiveness of a particular program or program component. Evaluation of programs is based upon a comparison of actual results with desired results or objectives.

Outputs of the Process

The planning process results in plans which are the output of the process. Plans should be a documentation of the entire process. They should be formal, written documents that state the goals and objectives, the programs and activities considered, the assumptions made and the analysis used, the conclusions regarding programs to be pursued, the allocation of resources for these programs and activities and the policies that are to govern the use and disposition of the resources. The plan must include milestone dates that can be used for control of the activities or programs. It is recommended that the interval between milestones in the plan be selected to insure that corrective action can be taken before activities progress too far in the wrong direction.

Goals of the SRCS Process

The first and fundamental part of planning must include the determination of goals. As an educational support function, the class scheduling and student registration process must help implement the institutional goals and objectives as determined for the instructional, and some parts of the public service components. As such, the specific goals of the entire SRCS process have been delineated as follows (the goals are not necessarily mutually exclusive, all attainable, or all desirable in a specific institution):

1. Provide for effective use of the school's resources — space, personnel, equipment. For example, improved utilization of classrooms, more effective use of faculty talents, better cost-effectiveness in the SRCS process.
2. Minimize the inconvenience to students, faculty, counselors and

administrators. For example, fewer and shorter lines for students, less direct faculty involvement in registration, more orderly procedures for registrars, cashiers, etc.

3. Produce accurate and complete data as needed for appropriate personnel — students, faculty, counselors, administrators and outside agencies. For example, confirmed registrations to students, number of students enrolled to administration, class lists to faculty, number of minorities enrolled to HEW.
4. Allow sufficient time to complete the process. There must be time enough for students, administrators and others who are involved in the process to accomplish that which is necessary for effective decision making and proper management.
5. Enable normal progress toward degrees by students. Students should be able to achieve sufficient credits for graduation in a reasonable length of time, e.g., two years for an associate degree barring failures and other such problems.
6. Provide effective academic advising/counseling to students.
7. Decrease the number of registration changes and errors.
8. Provide personal attention to students.
9. Provide equitable scheduling to both students and faculty. Both student and faculty desires should be considered when determining schedules of courses offered and scheduling students into classes.

The nine goals delineated above have been ordered in terms of their overall relative importance when one considers the entire SRCS process. Whether one agrees with the relative ranking as indicated is not important. What is necessary, however, is that a particular school, when facing a particular problem or new proposal concerning the SRCS process, must establish a priority sequence and in essence assign weights to each of the goals. Many activities formulated to achieve objectives will impact or affect a number of other goals and related objectives. A rationale should exist in order to take this coupling effect into account.

One technique is to assign various weights from a scale of, for example 100, to the nine goals. The sum of the weights assigned would equal 100 and the weight assigned to a particular goal would reflect its relative importance at the particular college. This is illustrated below where the weights have been selected arbitrarily to demonstrate the technique.

SRCS Goal	Relative Importance Weight
1	30
2	0
3	20
4	10
5	0
6	0
7	5
8	5
9	30
	100

This type of technique is not a necessity but it is important that the personnel involved in making decisions about changes and proposals understand the relative effects on the nine goals and also agree on the relative importance accorded to each.

Any facet, detail, or procedure involved in the SRCS process must be the result of attempting to reach some combination or all of these nine goals. But such goals, normally agreed to by everyone are not enough to lead directly to new systems design, etc. The goals specify no time frame for achievement, and do not specify a method of measurement or evaluation. Thus, **objectives** are needed.

Objectives of the SRCS Process

The process of determining objectives is not necessarily a simple one. It is in many cases extremely difficult, time consuming, and perhaps even frustrating to set meaningful and measurable aspirations. Obviously, some are easier than others. But objectives can be determined.

The crucial and basic question which must be asked when attempting to set objectives is, "Can I measure its success?". If a statement is to qualify as a valid objective, it must generate a positive response to that question. For a detailed discussion of criteria for evaluating and the process for setting objectives, two references are cited. The Manual for Institutional Planning prepared concurrently with this manual, and the book entitled **"Goal Analysis"** by Robert F. Mager, Fearon Publishers, Belmont, California, 1972 are excellent references.

As stated above, objectives are generally considered progressive steps toward a goal. Steps to be taken will be influenced by the environment in the individual institution. Examples of objectives are shown below. These are in no way meant to be prescriptive or even desirable. They are listed merely as examples of valid objectives which relate to the nine goals. Note, they are measurable, indicate a time frame, and relate to the goals.

Sample Objectives Related to SRCS Goals

Goal	Sample Objectives
1. Effective use of resources	1. Increase classroom seat utilization to ___% in Autumn Quarter, 1973-1974. 2. Reduce registration expense per student by ___% in Autumn Quarter, 1973-1974. 3. Reduce the number of classes with fewer than 10 students to 25 in the Autumn Quarter, 1973-1974.
2. Minimize inconvenience	1. Permit no line to extend beyond its outer doors in the Student Financial Aid office during registration beginning in the Autumn Quarter, 1973-1974. 2. Enable ___% of the students to register without writing their names more than twice beginning in the Autumn Quarter, 1973-1974.

3. Accurate and complete data	1. Produce APER by scheduled due date with no more than ___% errors in the Autumn Quarter, 1973-1974. 2. Provide all students who preregister with written confirmation of schedules by September 1, for next Autumn Quarter. 3. Provide enrollment summary to president in broad categories by Friday of the first week of classes next Autumn Quarter. 4. Provide initial class roster to faculty by Tuesday of first week of classes with ___% accuracy in the Winter Quarter, 1973-1974. 5. Provide matrices of time schedules for faculty and for room assignments by the end of the second week.
4. Sufficient time	1. Allow each student two weeks in which to determine his schedule request after publication of initial Quarterly Schedule for the Winter Quarter, 1973-1974. 2. Require all fee payments by end of ___th day of classes so that a ___% accurate enrollment count can be made by the beginning of the third week of classes in the Winter Quarter, 1973-1974.
5. Normal progress toward degree	1. Schedule second year students first, first year students second, beginning with the Winter Quarter, 1973-1974. 2. Allow sufficient places in a required, nonprerequisite course for ___% of first year students, ___% of second year students, beginning with 1973-1974 year.
6. Effective academic advising/ counseling	1. Assign one academic advisor/counselor to each ____ students for the Spring Quarter, 1973-1974. 2. Generate for each academic advisor/counselor a printout of the student's earned credits, courses currently enrolled in, and credits needed to graduate, by the second week of the Spring Quarter in 1973-1974.
7. Decrease changes and errors	1. Reduce the number of drop/adds by ___% in the Autumn Quarter, 1973-1974 as compared to previous year. 2. Eliminate keypunching of individual schedule

	requests for all students who preregister for the Autumn Quarter, 1973-1974.
	3. Allow up to three alternate course requests per student during preregistration beginning with the Winter Quarter, 1974-1975.
8. Personal attention	1. Allow three days in which students may see counselors in the registration process beginning in the Autumn Quarter.
9. Equitable	1. Enrollments in sections of a multisectional course may not vary more than ___% in a Quarter beginning with the Spring Quarter, 1973-1974.

Communication of Goals and Objectives

When managing the SRCS process, it is important for all parties directly involved in the design and operation to thoroughly understand the goals and objectives which have been set. For example, it is important that whether one is designing a very complex on-line registration system, or increasing the number of personnel staffing the class card files, all managers, employees, and perhaps, even students understand what is being sought by the change or the system. Obviously, specific, written, measurable objectives are necessary for such understanding to exist. Decisions about such systems or changes should not be made until and unless such goals and objectives are specified and accepted.

Remainder of the Planning Process

The remainder of the planning process after the specification of the goals and objectives involves what are described as five distinct, yet closely related steps. They are the determination of alternate programs, the calculation of resource requirements for each of those programs, the selection from among those alternative programs, the actual decision or allocation of resources, and finally evaluation of the programs. Though the language may sound complex and too organized, the steps described are simply those which most everyone uses to solve any problem or reach some decision. In this manual, detailed attention will not be given to those remaining general processes. Rather, in the course of discussing some of the actual operations in the SRCS process, many of the factors involved in the steps mentioned above will be discussed, particularly alternate programs and evaluation.

Generally speaking, the entire planning process involves much cycling within it before decision making and resource allocation are completed. For example, it is not unusual for objectives to be set and agreed upon, and then to determine that resources are too scarce for implementation. Thus, the process must recycle to consider either reduced objectives and/or finding additional resources.

3. Schedule Preparation

Overview

This chapter is concerned with the Master Course Inventory and the Quarterly Schedule. the two documents which indicate the specific courses comprising the curriculum of all the instructional programs of a college. The manual will not be concerned with the overall subject of a curriculum development, but rather will start on the premise that instructional programs and course schedules now exist. Therefore, curriculum development, will be discussed from a modification viewpoint, and not from an originating aspect.

In simplistic terms, the Master Course Inventory is an inventory of all courses which comprise a curriculum, while the Quarterly Schedule is an inventory of courses to be offered in a specific quarter of an instructional calendar. The Master Course Inventory normally prepared far in advance of actual offering, contains more but less detailed information, and is more a planning document than an operational one. On the other hand, the Quarterly Schedule is usually prepared at a time much nearer to actual offering, contains very specific and more detailed information about actual courses and sections, and is much more of an operating tool than a planning tool. In one sense, the Quarterly Schedule is a subset of the Master Course Inventory, but greatly expanded in terms of the specific data about each course which shows on it. Thus, the two are very closely related.

The processes by which the two are developed are therefore closely intertwined. Faculty clearly have the responsibility and authority to design curricula and courses. Approval of such courses then follows from both academic and financial considerations. This results in a Master Course Inventory. The Quarterly Schedule, as a subset of the Master Course Inventory, is also originated by the faculty and academic administration. More detailed decisions such as teaching, technology, a number of sections, time and location, etc. are made by both academic and central administration and a Quarterly Schedule results.

This chapter then will discuss separately the two schedules, discussing for each its functions, content, process of development and evaluation.

Master Course Inventory Functions

The Master Course Inventory serves many separate and interrelated functions enumerated as follows but with no ranking of importance implied:

1. Support the college management process. The schedule, with enrollment projections, faculty and personnel estimates, workload estimates, etc. serves as data to assist in making resource allocation decisions.

2. Help department heads plan faculty assignments and projected need for faculty.
3. Assist program managers (Deans and similar bodies) in structuring degree requirements. It serves as the focus of discussions about program requirements and course content, between program managers and operational department heads.
4. Assist students in planning their future enrollments. Students need it to map out a long-term plan to reach their degree plateau.
5. Assist student advisors in aiding and counseling students and prospective students about their enrollments. The Master Course Inventory, in conjunction with students' programs and prior earned credits constitute the primary data needed to advise on academic matters.
6. Provide information to prospective students concerning course content, objectives and scope of curricula. This is usually accomplished in the context of a printed bulletin or catalog, but the information comprises a Master Course Inventory.
7. Serve as the basis for the preparation of the Quarterly Schedule.
8. Assist faculty in preparing for teaching. The Master Course Inventory, because of its course descriptions and objectives, provides the necessary first guidelines to prepare outlines, establish texts, etc.
9. Serve as historical file of course offerings.

Master Course Inventory Content

The Master Course Inventory should contain a listing of all courses offered over a five-year span; two years before the current year, the current year, and two years after the current year. The two past years give a semblance of historical data needed for planning, while two future years gives both students working out schedules to graduation and the college sufficient information to infer financial commitments.

For each course, the following minimum information should be included:

1. Department responsible for or offering the course
2. Course number
3. Course title
4. Course description
5. Course objectives
6. Credit hour range
7. Discipline codes (OBOR and HEGIS)
8. Financial codes
   (Special fees, OBOR level and subsidy codes)
9. Enrollment limits
10. Prerequisites and corequisites
11. Last time offered (quarter, year)
12. Number of quarters offered in previous two years
13. When to be offered (quarters and years) in next two years

Master Course Inventory Development Process

Master Course Inventory have been developed over the years in many ways to satisfy numerous pressures, interests and aspirations. The expansion of knowledge, special interests of faculty, advisory committee recommendations, community and student needs, prestige, availability of funds, institutional uniqueness, accreditation requirements, and general curriculum revi-

sions have been reasons for creating new programs and courses, and eliminating old ones.

The study of and process for curriculum development in its broadest sense will not be stressed here. Rather, we will treat the subject from the standpoint of making changes to an existing Master Course Inventory - generally adding or deleting specific courses, or combining thereby resulting in additions and deletions.

Program Budgeting Development of the Master Course Inventory Schedule

As described in the Program Budgeting Manual, academic departments in the course of the budgeting process must develop or revise their Master Course Inventory. These revisions or updatings are completed on the basis of data from program managers concerning course content needs, enrollment projections (at least in a rough sense), curriculum revision pressures, and other such available information. Through this process, departments wind up at a point in time with a Master Course Inventory, and with resource allocation commitments sufficient to handle the implications of the Inventory for one year (through the current operating budget). Normally, this should occur in the early Fall of the year prior to the budget year.

Although much communication between program managers and department heads has occurred in the initial process of program budgeting, it is important for departments to share the completed Master Course Inventory, and estimates of the number of program students by course to be serviced by the Inventory, with all pertinent program managers. Only then can a program manager feel assured that his students will have schedules in the coming year. In that way, major changes in estimated numbers of students, or other major factors which could affect the schedule, can be resolved.

Changing the Master Course Inventory

Whether in the course of budgeting, or at any other time throughout the year, changes in the Master Course Inventory will be made. Additional courses, changed data describing courses, deleted courses and combinations of the three constitute the kinds of changes. They may be major, such as the introduction of a revised curriculum, or minor, such as a revised course description, or obviously anywhere in between. The process by which such changes occur is extremely important and complex.

Clearly certain principles apply. The process must not only recognize, but also insure, that the academic departments and their faculty have chief responsibility for and involvement in the process of change. Commitments to students must be considered and honored, and resources must be available and allocable - whether space, equipment, or faculty skills. All pertinent or affected groups or departments must be considered. Finally, proper notification of changes must be given. A suggested process therefore would include first a thorough and detailed analysis at the academic department level followed with formal approvals by a body such as a curriculum committee. Sufficient time for notification and study by interested parties must be allowed. There should be a central administrative office charged with the overall record - keeping maintenance for the process, as well as notification to other offices such as those responsible for admission, registration, financial and enrollment projections, and bulletins. The process should furnish

answers to the following kinds of questions, especially if substantive changes such as new courses are being suggested.

1. How many students are expected and/or affected?
2. Are resources available - (faculty, equipment, space, etc.)? What are the estimated resource needs? What teaching technology is to be used (lecture, individual study, laboratory)? What are the fiscal constraints and effects? What is the effect on teaching loads in the department?
3. What is the relation of the new course to the rest of the program curriculum? What course or courses will this replace?
4. When is the course to be offered? (quarter and year) How often?

Master Course Inventory Evaluation

For a number of reasons, the Master Course Inventory needs to be reviewed and evaluated in an earnest, systematic fashion. Course proliferation, too many discrete courses, prerequisites which are now irrelevant, lack of vocational relevance, misleading program descriptions, lack of clearly defined course objectives, excessive costs, and other such judgements clearly indicate the need to evaluate the Master Course Inventory. We suggest regular evaluation from two vantage points; curricular and cost.

Curricular Evaluation

By curricular evaluation, we mean to address such questions as:

1. Are there too many specific and specialized courses? Can they be condensed? Can some be eliminated? Should the program be more general or more specialized?
2. Are course content descriptions accurate? Does each course have clear and understandable objectives?
3. Are prerequisites and corequisites clearly stated? Need they be changed? Is practice difference from policy?
4. Are descriptors such as course level, discipline and credit hours valid?

These are clearly questions which can only be addressed knowledgeably by faculty in academic departments. Comparison with other colleges and with curriculum guides in the professional discipline associations, study of their students' progress toward degrees, and follow-up studies of graduates are three of the most obvious means of such self-evaluation. It is felt, however, that pressure to seriously undergo such self-evaluation by faculty must be exerted from other than faculty. Budget reductions (especially if some of the savings can be retained) and student pressures for curriculum change are usually effective. It is suggested, for example, that serious study be made of the enrollment histories on a course by course basis of students who have attained degrees to point up actual patterns of enrollment which may often differ from theoretically required patterns.

The process for such evaluation should be systematic and formalized. It is, however, time consuming and without quick or immediate results - and this is probably good. We suggest that major curriculum evaluation be completed periodically, possibly every three to four years, by each teaching department and program manager.

Cost Evaluation

The other major aspect of Master Course Inventory critique is concerned with evaluation from a cost standpoint. In this sense, cost refers not only to the specific expense of offering a particular course, but more broadly to the overall use of resources involved in staffing for the full schedule of courses. The process for such review should furnish answers to the following kinds of questions:

1. Are there too many low enrollment courses and/or sections offered? Can some be eliminated or condensed?
2. Can courses be offered less often? (A course might be offered one quarter every two years, instead of four quarters every two years)
3. What is the direct expense per student-credit-hour taught for each course per quarter? (Such a figure ties together class size with expense.)

Answers to these questions require a management information system of some complexity. For example, an institution needs to have a cost accounting system (for at least direct expenses) which incorporates student and course data with personnel (faculty) and financial data. Such systems are usually not developed and implemented in a short time. However, schools in Ohio have already been collecting and assembling in one report, the OBOR Faculty Service Report, the necessary raw data. Though only required in the Summer and Autumn Quarters, this report provides a major step forward in determining expense per student-credit-hour per course information.

In a less complex manner, similar evaluation can be accomplished by studying enrollments in courses over a two-year period. All schools should establish guidelines for minimum class size to which actual enrollments could be compared. We suggest the schools develop a policy that reflects differences in level of the course and students, yet at the same time allows exceptions for sound academic considerations. This kind of evaluation, usually accomplished on a course by course basis, can also be accomplished on a total schedule of courses and used as a guide to determine whether many courses are in fact being planned.

We have addressed thus far only the questions and data needed in the cost evaluation process. The actual course evaluation and curricular implications must be completed by faculty, but the initiative for action will probably need to come from some other source. If a management information system is in effect, as described above, the office responsible for it should probably initiate specific cost evaluation. In other cases, the office may be the registrar, controller, institutional research, academic vice president, planning, etc. depending on the school's organization. Clearly, however, some office or person should be responsible for such cost evaluation data and initiation.

Dropping Courses from Master Course Inventory Schedule

If as a result of cost or curricular evaluation, courses are to be eliminated from the Master Course Inventory, two additional items need to be stressed. First, and rather obviously, student-program needs must be considered. For example, will dropping the course prevent some students from graduating on time? Are alternatives available to students who planned to take the course? Second, it is important that the process require approval by, or at the least formal notification to, all program managers and other groups

and offices which could be affected by such deleted courses - e.g., office responsible for enrollment projections, registrar, etc.

Master Course Inventory Responsibility for Maintenance

The Master Course Inventory, to be useful to faculty, students and administrators, must be kept up-to-date and easily accessible. The former requires that updating responsibility must rest within a single organization, for example, the registrar. To simplify accessibility and ease of change, data processing techniques, although not a necessity, can be productively utilized. For example, the Master Course Inventory can reside on a file in the data processing system. File updating techniques, possibly initiated via on-line terminals or remote job entry stations in the responsible office, can be utilized for additions or changes. Terminals with video displays, if available, could also be used in an inquiry mode to survey parts of the Master Course Inventory. Hard copies of subsets of the Master Course Inventory (for example, the Quarterly Schedule) could also be produced at the computer center by appropriate file management programs. If the resources could be made available for computerizing the storage and updating of the Master Course Inventory, a number of additional benefits could result: Computer generation of college catalog, data bank for institutional research and decision making, up-to-date curriculum information to advisors.

Quarterly Schedule Functions

Whereas the Master Course Inventory is primarily a planning instrument, the Quarterly Schedule is a very operational tool - a necessary ingredient of the registration process. Its functions can be enumerated as follows:

1. Assist students to actually register for a block of courses in a specific quarter.
2. Inform students' advisors of the specific courses to be offered in a given quarter.
3. Inform the office responsible for registering the students of the specific courses and sections and other information necessary to register the students.
4. Record the detailed information necessary to support each course offered in a specific quarter, e.g., faculty assigned, days and times offered, number of sections, teaching technology, (i.e., laboratory, seminar, lecture) and space assigned.
5. Be an ongoing or current record of the actual registration for a specific quarter.
6. Provide a basis for formulating the Quarterly Schedule one year hence.

Quarterly Schedule Content

As will be discussed, the Quarterly Schedule may in fact consist of many documents, depending upon the particular philosophy and processes used in the overall registration process. In another sense, the Quarterly Schedule may be thought of as a document which becomes more specific as regards its detailed content as one progresses through the registration process. But regardless of the philosophy or process, the Schedule should assimilate the following data for each specific course and section of that course to be offered in a quarter.

1. Department responsible for or offering the course
2. Course and section number

3. Course title
4. Credit hours assigned
5. Discipline codes (OBOR and HEGIS)
6. Financial codes
7. Enrollment limits
8. Space assignment
9. Days and times offered
10. Instructor's name or social security number
11. Number of students enrolled
12. Teaching technology
13. Year and quarter

Additional data may be desired by individual schools. For example, the following information may be helpful for certain aspects.

1. Number of paid enrolled students
2. Number of auditors
3. Number of students added and dropped
4. Examination schedule

Development of Quarterly Schedule

The Quarterly Schedule is developed initially as a subset of the Master Course Inventory. (In point of fact, this should always be. No course should be offered or indicated on the Quarterly Schedule if it is not on the Master Course Inventory.) Indeed, many of the items comprising its content are taken directly from the Master Course Inventory; department, course number, course title, credit hours, discipline and financial codes, enrollment limits, and quarter and year.

The following illustrates the preparation of the Quarterly Schedule.

The process is initiated by a vice president for academic affairs, dean of instruction, or a similar officer of the college. He requests the department chairmen to provide the basic information as listed on Exhibit 3.1. The chairmen gather the information for each program from the coordinators and submit it to the vice president. A meeting is generally held to discuss in broad terms any special needs, circumstances, conflicts, etc.

The vice president then generates a tentative schedule. The department chairmen are informed and given an opportunity to react. Adjustments, if necessary and if possible, are made and individual staff members are notified in writing (Exhibit 3.2) of their pending assignments.

Two fundamental questions must be answered in order to describe further the Quarterly Schedule process:

- When are the additional specific data items entered into the Quarterly Schedule?
- Which offices have responsibility for which data items?

The Quarterly Schedule is in some respects a dynamic document throughout the process of registration. Though it must be originated prior to advance registration, some data may change as registration progresses and/or some data need not be entered until late in the process. For example, added or canceled courses, expansion of enrollment limits, and changed space assignments are not unusual in the course of registration. Thus a Quarterly Schedule is not really final until the registration process for that quarter, including late registration and registration changes, is completed.

CLASS SCHEDULE WORK SHEET

EXHIBIT 3.1

_____ Program or Department For _____ Term & Inclusive Dates _____ Person Completing Form

Course #	Course Title	Contact Hrs Per Week	Preferred (Time(s))	Room (s) Needed or Preferred	(a) Number of Students Anticipated. (b) Suggested Number of Sections.		Suggested Instructor	Other information (eg. if modular scheduling, what arrangement: 3-2, 2, 2, 1, etc. Different room needs, different days? Combine with other groups?)
					(a)	(b)		

With the foregoing in mind, then, it can be said the Quarterly Schedule undergoes several major reviews by academic and central administration from its inception to its conclusion. The first occurs immediately after its generation, when it is prepared for the advance registration process. Another may occur as a direct result of demand analysis if used, and another occurs as a result of the actual sectioning — scheduling portion of the registration process.

In order to answer the two questions raised above, the following eight questions must be answered. There are undoubtedly more, but these seem crucial to the development of the Quarterly Schedule.

Number of Sections and Day and Time Assignments

1. Who has responsibility for determining the number of sections, and for assigning days and times offered for specific courses and sections? Does this responsibility rest with the academic departments offering the courses or some central administrative office? The number of sections of a course that are offered is critical, in part because it directly influences the total number of faculty that is maintained. A balance must be maintained between the students' needs (reasonable period for a degree, reasonable schedule of courses) and the colleges use of, and need for, resources (faculty, space, equipment). Academic departments are quite naturally, not in a position to achieve this balance and it is recommended that a central administrative office (dean of instruction, vice-president for academic affairs or similar officer) have the authority and responsibility for determing the number of sections.

   The designation of days and times for a specific section is dependent upon three aspects — availability of space such as a classroom or a laboratory in which to hold the section, availability of faculty to teach the section, and the availability of students to register for the section. All three must be satisfied. It does no good, for example, to schedule a class at a time when a classroom and the faculty member assigned to it are available, if the students for whom the class is offered cannot attend because of another class or work conflict. Similarly, students and faculty must have a location at which to meet.

   Generally speaking, it is recommended that day and time assignments for specific courses and sections rest with the academic departments. If left unconstrained, however, chances are good that a great majority of the classes will then be scheduled at prime hours during the week. Such a situation not only creates space inefficiency (by heavy use of facilities at some hours — very light use at others), but also may increase the number of students unable to schedule a set of courses. For these reasons, it is proposed that academic departments follow guidelines or quotas established by a central administrative office, preferably the office responsible for a space assignment. For example, each department may be assigned a limited number of prime times, e.g., five MWF 10-11:00 a.m. slots. Quotas could be set such as only 55% of all classes being scheduled during the favored hours, or a policy could be established requiring all **new** sections and courses be scheduled during unfavorable hours.

EXHIBIT 3.2

STAFF MEMBER ASSIGNMENT SHEET

Name _____ Term _____

Period	Time	Course(s)	Credit Hours	Course Number(s)	Group(s)	Room
1	8:00-8:50					
2	9:00-9:50					
3	10:00-10:50					
4	11:00-11:50					
5	12:00-12:50					
6	1:00-1:50					
7	2:00-2:50					
8	3:00-3:50					

Other Responsibilities: _____

Space Assignment

2. Who has responsibility for assigning space to specific courses and sections? How is the assignment actually performed? Are certain rooms or blocks of rooms assigned to specific departments for their use only? At the other extreme, are all space assignments made by some central office? Obviously, special purpose rooms such as teaching laboratories must be scheduled by the host departments. But space which physically can be used by others such as classrooms and seminar rooms may be scheduled quite inefficiently if handled the same way.
This Task Force favors the system whereby departments are encouraged to express preferences, but where final authority rests with the space scheduler. (See Chapter IV for a more complete discussion of space assignment.)

May Students Request Specific Times?

3. Are students permitted to request and register for classes offered at specific time? If the answer is yes, then obviously day and time information must be available to the student before he begins the advance registration process. If the answer is no, then the day and time data need not be entered until actual sectioning takes place.
Generally speaking, the information about days and times offered should be available to students before requesting courses. Many of the sectioning-scheduling problems can be resolved by students in the process of selecting course requests. Any serious problems such as the offering of two corequisite or required courses only at the same time can be determined and rectified early, rather than later.
This is no indication that a student's choices of times must always be honored. (This point is covered more fully in Chapter V — Registration Systems.)

May Students Choose Specific Sections?

4. Are students permitted to choose specific sections of a course? For example, if more than one section is taught at the same time, may the student specify a preference? Again if the answer is yes, then specific section numbers must be available before advance registration. If not, then the section identifiers can be omitted until sectioning.

May Students Choose Faculty?

5. Are faculty assignments to specific courses and sections to be available to students prior to registration? The answer obviously dictates when the information concerning faculty must be added to the Quarterly Schedule.
Generally speaking, a guideline to follow is that the faculty assignments be made known to students.

Must Students Know Space?

6. Are space assignments to specific courses and sections to be available to students prior to registration? As above, the answer dictates when the information must be added to the Quarterly Schedule. When physical distance between classes is likely to be a major prob-

lem for many students, the recommendation is for the inclusion of space data — otherwise not. In all cases, it will probably be necessary to issue an up-to-date room schedule just prior to the start of classes. This will notify students of room changes and/or provide them with the necessary space information for the first time.

Demand Analysis

7. Is demand analysis used? Demand analysis is a procedure by which a school analyzes student course requests before actual sectioning takes place. Usually computerized, the process tallies requests for every course, by time slot offered. It can also tally and indicate the disciplines and levels of the students requesting. These numbers are compared to preset enrollment limits, and then in conjunction with other data, departments have a chance to study and change the Quarterly Schedule. Other data normally needed are previous enrollment projections, withdrawal and attrition experience figures, and data which indicates the percentage of the total enrollment reflected in the demand analysis.

   By having and analyzing such data prior to sectioning, some problems can be recognized and solved by changes such as opening more sections, increasing allowable sizes, and/or cancelling or condensing sections and courses. This should result in more students' schedules being satisfied. Secondary benefits include a probable reduction in registration changes and early forecasting of schedule problems even if not resolved by Quarterly Schedule changes.

   However, some cautions need to be stated. Demand analysis is primarily helpful only where students are permitted great flexibility in curricula, and/or when course by course enrollment projections have proven to be poor. This may only occur in the larger two-year colleges. Demand analysis requires a significant amount of time during the registration process. It also requires a separation in time between course requesting and sectioning; usually requires extensive computer support, and thus may be expensive. It may lead to a de-emphasis of the enrollment projections and program manager communication so important to the budgeting process. Finally, it should be noted that changes in the Quarterly Schedule, which appear to be necessary as a result of demand analysis, may in many cases not be practical because of previous budgetary and personnel commitments.

Sectioning Method

8. Is computerized scheduling used? Such a tool, to be effective, usually requires that student requests for specific sections and times of multisection courses are not allowed or are not necessarily honored. Depending on the complexity of the algorithm used, the process schedules students into specific classes by giving first preference to higher level students (e.g., seniors), special groups of students (working part-time, etc.), and students having specific course requirements for degrees. It schedules single section courses first, and then multi-time courses. It may allow for specific alternate sections and courses. In addition to the actual sectioning, it also keeps

a running registration summary by course and section, and gives accurate data concerning not only the number of satisfied student schedules, but also, and perhaps more importantly, the unsatisfied student schedules. Such data can be used to support last minute Quarterly Schedule changes.

If the sectioning process is not computerized, running registration summary data are more difficult to establish, and unsatisfied student schedule data nearly impossible to acquire.

Whether computerized or not, it is critically important to provide quick communication between the offices generating the data and the academic departments, and to make and receive action (change) decisions quickly.

Other Data in Quarterly Schedule

Answers to the eight items above dictate to a great extent the actual process of developing a complete Quarterly Schedule. Aside from the specific data items mentioned above, it is clear that decisions concerning teaching technology, course enrollment limits and faculty assignments are the responsibility of the academic departments. This is no indication that others are not involved in such decisions, but certainly final decisions rest there. (For example, the space assigner may have a great deal of input to decisions concerning teaching technology and enrollment limits.)

Quarterly Schedule Evaluation

The Quarterly Schedule should be evaluated from at least three viewpoints:

1. Use of faculty and staff culminating in an evaluation based on expense.
2. Use of space as measured by utilization.
3. Ability of students to have satisfactory schedules leading to appropriate degree progress.

The first need not be described here because it is covered under the Master Course Inventory cost evaluation section of this manual. Though that topic was addressed to the Master Course Inventory, the methodology involves evaluating course by course expense for each quarter and/or studying class size data for actual courses and sections offered in a quarter. In effect, therefore, this amounts to evaluating the Quarterly Schedules.

The second kind of evaluation, concerning the effective use of space, will be covered in Chapter IV. Though concerned with all space used for instruction, evaluation primarily concerns classrooms and scheduled laboratories.

Evaluation Re: Students

The third type of evaluation is perhaps the most important in terms of the public mission of the institution. It revolves around two related but not dependent questions, "How many students are receiving satisfactory (to them) schedules of courses and sections?", and "Are students unable to graduate in a **normal** period of time, because of a required course (or courses) not being open to them in some quarter?"

Both topics are affected, not only by the content of the Quarterly Schedules, but also by the registration process. Thus, evaluations of both must clarify the source of any problems. The Quarterly Schedule and/or the registration process may be the source. For example, the problem of an

upperclass student closed out of a required course may be a result of sectioning underclassmen before upperclassmen. The problem may be solved by changing the Quarterly Schedule (raising enrollment limits) and/or by changing the registration process (sectioning upperclassmen first).

Of the two questions raised, the second, dealing with degree progress time, is surely the most far reaching. It is concerned with meeting a school's basic commitment to an entering student. The other question, concerning satisfactory schedules, though probably not having long-range degree progress effects, usually affects more students. Thus, the clamor is more vocal, and more immediate.

Evaluation can take many forms therefore — at least six specific items may be considered:

1. **Demand Analysis** — Already addressed in detail above, demand analysis is in essence a form of evaluation.
2. **Sectioning** — The process of sectioning, depending upon form, and attention afforded it, may in fact allow for immediate evaluation as described above. Computer sectioning, for example, if programmed properly, can provide detailed information concerning percentage of students satisfied, sections changed, etc.
3. **Program Managers** — Deans and others responsible for degree programs usually are aware of any long-term scheduling problems encountered by their students. Not only should they be expected to lead the charge in the subject of degree progress evaluation, but an evaluation process should be structured to encourage and extract data from them.
4. **The Students Themselves** — Though obvious to any program manager, advisor, or registrar, it needs to be stated that the students are an excellent source of scheduling problem information. This manual would only encourage that perhaps some formal process of gathering the information be established. This may be in the form of suggestion and/or problem boxes, polls, ombudsmen, etc.
5. **Registration Change Analysis** — A study of drops and adds may reveal patterns of dissatisfaction with schedules.
6. Longitudinal studies of students' courses taken through their graduation may reveal patterns of attendance which could affect future schedules.

(These last two items probably require effort by a central office not involved in operational affairs. They are more long-term and probably should be undertaken only if data from the first four items warrant it.)

The actual process of Quarterly Schedule evaluation and review, as measured by student schedule satisfaction and particularly degree progess, should focus on the program managers. With data suplied by themselves, the students, and central offices such as the registrar, program managers are in the best position to determine when changes are needed, and to initiate and request changes by teaching departments and/or in the registration process.

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4. Space Scheduling

Overview

One of the major components of the SRCS process is that of providing physical space in which faculty members and students meet together to carry out the actual instructional process. In short, this means providing those rooms broadly called classrooms and teaching laboratories. (Such space accounted for about 36% and 60% respectively of the Ohio Public Community and Technical Colleges total net assignable square feet in 1971.) The manner in which such spaces are assigned to specific classes is affected by and directly affects both the schedule building process and the actual registration processes. This chapter will address this topic from four vantage points — responsibility for assignment, assignment procedures, timing, and utilization.

Because of institutional size, age and tradition differences, the approach to space scheduling varies among the colleges. In some schools there is little or no interaction regarding room assignments between the vice president or dean responsible for space assignments and the academic departments. For these schools much of this chapter will be only of informational value. For the other schools, for example, those colleges following the procedures of Chapter III involving academic department input, in terms of preferences, to the Quarterly Schedule development, much of this chapter will be appropriate.

Space Assignment Responsibility

Historically in universities, classrooms and teaching laboratories were controlled and scheduled by the academic departments and colleges. Blocks of classrooms and laboratories were usually able to be used only by the departments to which they were assigned. Normally such rooms were directly adjacent to or interspersed with the offices where the faculty were housed. When a classroom needed to be used by another department, it was done only through negotiation with and approval by the host department. The tremendous student growth at the universities caused a major change to take place in this process in the 1950's and 1960's however. Because of the generally low level of space utilization which resulted from the old way, and the heavy pressure for more space which accompanied the increasing numbers of students, responsibility for classroom assignment (not laboratory) was made the responsibility of some central administrative office on each campus. In most cases the registrar was the person so charged. Utilization rates increased significantly on a university-wide basis.

In Ohio's Public Colleges the responsibility for classroom assignment has been typically carried out by assignment of a central administrative officer such as the academic vice president or dean of instruction. In some of the larger colleges a registrar performs this function. This practice tends to

minimize underutilization that can exist under departmental control of classrooms. Only in those few instances where classrooms have specialized facilities are the rooms reserved for certain departments.

The practice of centralized assignment of control should continue. **It is recommended that responsibility for the assignment of any instructional space which physically can be used by more than one department should be assigned to a central school-wide office.**

In the context of the Ohio Board of Regents Uniform Information System, such general purpose rooms are classrooms (room type 110), lecture halls (room type 120), seminar rooms (room type 130), and perhaps a few scheduled teaching laboratories (room type 210) such as drawing or drafting rooms. All other instructional space should be assigned by the host academic departments to which their use must be restricted because of special facilities. Specifically included in this category are the bulk of the scheduled teaching laboratories (room type 210), and the unscheduled teaching laboratories (room type 220), and the individual study laboratories (room type 230).

Space Assignment Processes

Though responsibility for space assignment can be easily stated, the actual processes for accomplishing it are more complex. The nongeneral purpose rooms, assigned by the using departments to themselves, present no problem. Such departments are aware of their space limitations when designing the Quarterly Schedule, as well as the MCI, and thus schedule course sections and set enrollment limits which will insure the availability of laboratory space. No additional consultations regarding such space assignments are necessary.

But the general purpose rooms require more complex procedures. Obviously, if no controls are exercised or guidelines given, each individual department could schedule its own courses and sections without regard to space availability. All of these course schedules could then be given to the space scheduler so that he could assign appropriate rooms to the sections. Such a process may be feasible if an unlimited number of classrooms with full range of sizes were available. But such is not the case, nor should it be. Such a process usually leads to more classes than classrooms being offered at a particular time of day. Consequently the scheduler must then choose and require one or more departments to change the time(s) of certain courses. That choice function, by its nature, is subject to controversy and inequity. Furthermore, changing the time of a course or section after plans have been laid, may throw faculty and/or student schedules into conflict. For the above reasons, guidelines for course and section scheduling must be established prior to initial Quarterly Schedule planning by academic departments.

This manual recognizes three such methods by which guidelines are stated. They are numbered below in the order of preference.

1. **Time allotments** — In this technique the central space scheduler sets limits concerning the number of courses and sections which may be offered by each of the departments at specific day-time periods throughout the week of classes. (For example, the business department must offer no more than seven courses on Mondays at 10:00 A.M.) The limits could encompass all or only some subset of the day-time periods available in the schedule week. The degree

of completeness depends on the school's particular utilization rate for each of the periods. Specifically if a school is only using 50% of its classrooms at a particular time, it may not need to set limits for that time. On the other hand, if a utilization is in the range of 85-100%, then limits must probably be established for that particular day-time period.

2. **New course or section guides** — Assuming that an existing Quarterly Schedule implies that all classes are housed in suitable space, another type of guideline would require that all sections or courses added in future quarters be offered at times not now fully utilized. This has the advantage of being stated and followed rather easily. But it does then accept any inequities already in the schedule. Furthermore, violators are difficult to catch if suddenly the scheduler finds himself with more courses than rooms at a particular time.
3. **Space or room allotments** — This method involves assigning blocks of specific rooms to specific departments for their primary use. In other words, each department is allotted, quarterly or yearly, a block of specific rooms in which it can offer its courses. Such a system, but one step removed from the traditional method, provides little flexibility insofar as class sizes and class time distribution pattern differences are concerned. Even the method of teaching could be hampered by such a system. On the other hand, once the allocations are made, the system is very easy to administer from the space schedulers standpoint, because he then has no specific course assignments with which to be concerned. Not so easy, however, is the actual room allocation process.

Honoring Preferences

Although the space scheduler has the responsibility and authority to assign rooms to courses, regardless which of the guidelines is used as described above, it is important to allow departments to state specific room, building, or general location preferences. Furthermore, such preferences should be honored where feasible and where doing so will not encourage inequities.

Settling Disputes

Regardless of the system used to schedule classes, occasions arise where the space scheduler is called upon to pass judgment having profound academic influences. For example, if only one large lecture hall exists, and two departments wish to schedule large lectures at the same day-time period, someone must decide between the two. Such decisions, clearly requiring that academic concerns as well as spatial concerns be exercised, should be referred to the academic officer having jurisdiction over the two. Normally, this would be a dean or academic vice president. If such problems or questions become chronic, the vice president may wish to appoint a committee to decide in his behalf.

Computer Assignment

There is no doubt that computers could be used to assign rooms to classes. Though the algorithm necessary to do this must be fairly complicated, it is possible. But from a cost/benefit standpoint, its utility is highly doubtful for most of the two-year colleges.

SPACE SCHEDULING

When Must Assignments Be Made

Because actual room assignments are a part of the Quarterly Schedule, the question of timing must be addressed in the context of its development. In Chapter III, brief mention was made of the fact that room assignments, if possible, should be on the Quarterly Schedule prior to advance registration. This supports the policy of providing students with as much information as possible prior to their actual submission of schedule requests in the registration process. But more needs to be said from the standpoint of space scheduling.

First, some specific space assignments may need to be made in the course of developing the Master Course Inventory, long before the actual development of the Quarterly Schedule. This is especially true of courses which require special purpose facilities such as a large lecture hall, laboratory facilities, special visual aids, etc. It makes no sense to place such courses on the MCI if their existence depends on special purpose space which is not available or scheduled to be available.

All other assignments should be made prior to advance registration, primarily for two reasons. The first is that of wanting to give the students as much information as possible. But the second is perhaps even more important. The Quarterly Schedule must include section size limits prior to advance registration. Such limits, in many cases, depend more on the size of the room than on purely pedagogical reasons. Thus to set an enrollment limit for a course at 45, when the room in which it will be held only holds 30, invites trouble in the form of registration changes, disgruntled students, and Quarterly Schedule changes after the fact.

Even if all assignments are made prior to advance registration, changes will inevitably occur. Added classes, over-enrollments, and changed enrollment limits which occur during the registration processes (both in advance registration and open registration) will cause room assignment changes to be made by the space scheduler.

Student and Faculty Notification

Although most room assignments are known before advance registration by students and faculty, enough changes and additions usually occur to warrant serious concern about making a final version known to all participants. Two methods, both feasible, are preferred. One calls for the publication of a separate room schedule just prior to the start of classes and the posting of this sechedule around the campus. Another involves printing the room assignments on the confirmation statements given to students after they have been sectioned.

Space Utilization

The concept of utilizing instructional space has received a great deal of attention by institutions, state agencies, professional organizations and foundations. The purpose of this section of the manual is merely to place the topic in context within the SRCS process.

The utilization of instructional space usually refers specifically to a school's use of classrooms, lecture halls, seminar rooms and scheduled teaching laboratories. Such space in total accounts for only 25-40% of a college's total net square footage. The actual measurement most often refers to two specific items — the first is the percentage of available hours in which rooms are actually scheduled with classes, and the second is the percentage of

available seats actually used by classes when scheduled in rooms. The base period of measurement usually varies anywhere from a five-day (8 a.m.-4 p.m.) 40-hour week to a six-day (all day) 65- or 70-hour week.

The concept of that which is good or acceptable utilization is in reality a compromise between two opposing yet realistic goals. The first may be considered to be the "full use of space" ideal. It calls for all rooms to be occupied fully all of the time. The other — the academic or pedagogical one — says that it is best to always have free rooms as well as unused seats in rooms which are used. This second goal enables students to find study space between classes, allows flexibility in scheduling, makes rooms available for special one-time meetings and classes, enables maintenance and allows expansion of classes, comfort and alternate seats when taking examinations.

The actual goal used by most schools lies between the two. Specifically, the OBOR has set, and most schools follow, a goal which calls for achieving 75% hours utilization and 67% seat utilization for classrooms, lecture halls, and seminar rooms, and 53% hours and 80% seat utilization for scheduled teaching laboratories. This goal is used not so much from an operational standpoint, as from a planning standpoint. In other words, building new instructional space might not be approved until a school reaches those utilization rates.

The actual room assignment process for a quarter does not really affect in any sizable manner the utilization statistics. Utilization depends more upon the number and sizes of rooms and courses, and not upon the method of assigning one to the other. Major changes in utilization may only occur through significant additions and/or deletions of classes and/or rooms. Given a reasonably stable enrollment and curriculum, utilization can only be affected by adding or deleting rooms and physically changing sizes of rooms. **Thus it is recommended, for example, that the room assignment process assign classes to the largest available room (within reason), rather than the smallest room which will hold the class.** (For example, if a 40 student class may be scheduled into a 45 seat room or an 60 seat room, assign the 60 seat room.) The seat utilization, through reduced by such a policy, nevertheless is not reduced enough to affect the overall institution's utilization.

5. Registration Systems

Overview

This chapter is concerned with the registration process — the process by which a student selects courses, is scheduled into those courses, and pays his fees. Integrated within this simply stated process are such necessary items as curricular and degree advising, possible financial aid, housing or locker assignment, identification card, book purchases, delinquent obligation check, and even admission or at the least verification of admission. Further compounding the process are the differing types of students, programs and organizations involved in registration on any college campus, as well as the literally thousands of individual decisions which must be made in the course of a registration for any one quarter or term. Furthermore, the process at most schools is handled in three different ways depending upon the time remaining before classes actually begin.

Probably in this area, more than any other treated in this manual, are the number of specific processes and procedures used on the campuses so varied and different in detail. Nowhere is it more evident that institutions can and do give differing relative weights or degrees of importance to the nine goals mentioned in Chapter II in the course of structuring their registration systems. Some put primary stress on personal contact while others stress satisfying student schedule requests. Some emphasize the elimination of lines and other frustrations, while others stress the maximum use of available space and faculty.

The chapter for the most part, therefore, will stress general guidelines rather than specific practices. Highlighted first will be those features applicable to all phases of registration. Following that, in order, the manual covers selection of courses/advising, advance registration, open registration, late registration, and aides to the registration process.

General Guidelines for Registration System

1. As is now done at most public colleges, this manual recognizes and encourages the use of three distinct registration periods at a school for each quarter - advance registration, open registration, and late registration. Each one is described in detail in later sections.
2. Though a great many offices and faculty members may be involved in the process, there sould be one individual assigned the responsibility and authority for coordination of the entire process. The registrar (or similar person with perhaps a different title) should be assigned.
3. As mentioned, many parties participate in the registration process - academic department heads, faculty, advisors, controller, cashier, student financial aid director, registrar, coordinators, bookstore

manager, admissions and students themselves. There should be a registration system advisory committee, chaired by the registrar, with representative from each of the appropriate segments mentioned above. This group should meet regularly, probably at least once a month, to plan, coordinate and evaluate the registration system.

4. The registrar, designated as the individual responsible for registration, should be allocated funds and other resources necessary to carry out the entire process. The other offices mentioned above should also be provided sufficient funds to adequately support the registration process.
5. Responsibilities for decisions which must be made during the process must be in writing, must be clearly delineated and made known to all parties. Furthermore, registration procedures must be designed to insure that such responsibilities are honored. For example, the registrar has responsibility for fee assessment and residence determination; the cashier or controller for fee billing and collection; academic department heads for section size changes, etc. It is good practice to have published the names of individuals responsible for each aspect, it will make them more accessible in the event of a problem.
6. Because of the complexity of registration processes, much emphasis must be placed on making the system understood by all parties involved. This implies clear directions, instructions, and timely communications to students, faculty, administrative, and especially staff personnel.
7. A separate registration for each Quarter, as is now practiced at all schools, is recommended. A fully completed registration for a full year is not recommended.
8. Many of the data files maintained and used within colleges are driven by the registration process. The student, financial, and curriculum data files are supported by the registration process. Design of the registration process must consider this support since registration captured data is critical to later outputs such as grade reports, accounts receivables, class lists, enrollment reports, etc.

Selection of Courses - Advising

The normal first step in any registration process requires the student to select those courses offered in the Quarterly Schedule in which he wishes to enroll in that particular Quarter. (In some of the curricula at the community and technical colleges, there is limited choice for the student. In such cases, much of this section does not apply.) This selection process requires in almost all cases, some additional information in the form of degree requirements, courses offered, prerequisites needed, student special interests, etc. To assist in this course selection process, advice, interpretation and counsel are usually offered the student through someone, often a faculty member who has been designated as an advisor to him. It is, in many cases, the advisor who, through the one-to-one personal relationship with the student, must represent the institution, interpret its curricular rules, and in effect be its official spokesman as far as the student is concerned. Because of this extremely important relationship, one which clearly affects and is a

part of registration, careful attention must be paid to it in this manual.

Conceptually, there are two opposing philosophies concerning curricular advising for registration purposes. One maintains that the student himself is responsible for assessing progress toward his degree. Through publication of its degree requirements and clearly written instructions, and offering counsel **only when desired** by the student, the institution fulfills its responsibility toward the student in this regard. The opposite view assumes that the school must continually monitor and assess degree progress for each of its students, a process which then requires every course enrollment, registration change, etc. be authorized by the advisor. The former places a major responsibility on the student, requires less "red tape", and perhaps is less expensive. On the other hand, the latter forces a heavy responsibility on the advisor, more work, and usually more procedural systems involvement in the registration process.

Where degree requirements are fairly rigid and structured, with few or no options, the student-responsibility mode is more workable. Situations are few in which there must be interpretations, "gray area" questions, and so forth. One either follows the set curriculum and graduates, or he does not follow it and doesn't graduate.

In some schools, however, more flexibility, course options and freedom to choose are being added to curriculum degree requirements. Fewer course prerequisites are required. Thus, the number of options available to an individual student has risen significantly, and by the same token, the number of questions, interpretations and judgments has also risen. On a campus today which practices the first method, it is quite possible for a graduating student to find himself in the position of having made a wrong interpretation or judgment in his course selection and thus not be eligible for his degree.

For the above reasons, this manual recommends a middleground position in which the institution recognizes its responsibility to assist the student toward graduation, yet does not require advisor approval of each and every registration and registration change. In substance it is recommended that a complete curriculum for a student be designed at the time of his first registration. This schedule of specific courses (which could even include alternate courses) would encompass two years' work. Completed jointly by an advisor and the student, the schedule would be recorded, attested to, and saved by both parties as well as the student's program manager (dean or department head) if different from the advisor. The student then need not consult the advisor at future registrations unless he changes the original agreement. Furthermore, the registration processes need not directly require advisor input in the form of signatures, etc. under this system. The student would know that the only courses acceptable are those agreed to in writing. If he wishes to change, it is then his responsibility to initiate contact with his advisor and change the original schedule - again in writing so that the decisions are recorded and saved.

It is necessary, therefore, that this acceptance of joint responsibility be made clear to both student and advisor.

Obviously, such a system places a great deal of responsibility on an advisor. He must thoroughly understand degree and program requirements and be able individually to structure curriculum schedules for his students. This implies that he must be well briefed, trained and assisted through sample curriculums, schedules, seminars, etc. He must also be physically available

to students, especially during that part of advance and open registration when student choices are being made. At most institutions, designated faculty members and/or academic administrators (department chairmen, deans, etc.) serve as advisors. Regardless of the group, it must be stressed to them and their superiors that advising is an extremely important aspect of their workload and therefore advising performance be included in items considered in evaluation along with teaching and administration. This may help to minimize a frequent problem regarding faculty motivation to participate in the registration process.

Advance Registration Overview

This is the registration process which takes place well in advance of the beginning of classes. For the Autumn Quarter, registration takes place during the preceding spring and summer. For the Winter, Spring, and Summer Quarters, registration usually takes place during the immediately preceding quarter. (For cooperative work students, it may need to begin two quarters prior.) Though the final "outputs" of the advance registration system are the same as for open and late registration, some of the actual processes used can and do differ. For example, use of the U.S. mail, demand analysis, and computerized sectioning and billing can be undertaken because of the drawn out time which is available by doing it well in advance. As a result, line lengths can be eliminated or shortened, the process can be spread out over time, staff can handle it with less stress and fatigue, and students can complete the process largely within the confines of their residences. It is also advantageous because it enables a very large percentage of the students to register in advance and avoid uncertainty regarding open courses at open registration. It enables open registration to be used primarily by students with course problems such as failures or program transfers, registration changes, latecomers, or other reasons which make them unable to make use of advance registration. (Advance registration also "creates" business for open registration. Many students may need to make changes in their advance registrations because of failing grades received, etc. As described later in this chapter, the registration change system must be designed to handle a large number of such changes - not always an easy process).

There are two basically different methods of handling advance registration - continuous and batch. The continuous system means that an individual student may personally go through the process and be individually scheduled while he is present. Batch processing on the other hand implies that the student's schedule request is held up and then scheduled later with a number of other students' requests in a batch. The former method involves more personal student-school relations and usually immediate answers to schedule requests. The latter, however, enables use of demand analysis and schedule modification prior to actual scheduling, and also provides for completion of the bulk of the process by the student using the U.S. mail system. **It is thus recommended that the batch process be used.**

Advance Registration Special Items

1. With either batch or continuous advance registration, schools may use computerized sectioning (scheduling). If continuous, however, on-line data entry computer terminals must be available with some dedicated computer storage capacity.
2. The handling of fee payments must be given thorough study. If

separate billings and collections are not handled by the controller's/cashier's office, special preparations must be made. These may entail bonding of registration staff (or individuals who collect the fees) as well as procedures for processing the money speedily to avoid cash flow income losses. **As a general guideline, however, it is recommended the billing and collection of fees be handled by the controller/cashier, and that it be accomplished after scheduling.**

3. A number of schools require payment before attending classes, and one school requires payment before classes are reserved for a student. The use of bank credit cards by students for fee payments is also employed. Many times, the bank will not charge the college a fee for processing since the bank has benefited both by providing a public service as well as having increased funds at its disposal. If fees can be collected at registration, a billing system and its associated work can, of course, be eliminated.
4. Provisions must be made to handle those students who have been scheduled, but who have not paid their fees prior to open registration. Certainly, no courses should be reserved for such students past a designated cutoff date, and the internal data system must be able to monitor that fact and change the Quarterly Schedule data accordingly.
5. In general, the computerized sectioning algorithm is not as flexible as hand sectioning (though it is faster and more equitable). It should provide, however, for alternate choices of sections, times and courses. Even so, 100% satisfaction will never be achieved with this or any other system. Thus, the system must be prepared to handle the student who receives a partial schedule. **It is recommended that such students be billed and in addition, given appropriate and clear explanations of the reasons for the partial schedule, as well as instructions for changing if so desired.**
6. The system must be prepared to handle communication problems. Students in transit, on vacation, lost and slow mail, etc. will cause a few problems. These must be considered and dealt with equitably.

Open Registration Overview

Open registration is that process which occurs just prior to the beginning of classes. Taking anywhere from one week to one day, it allows a student to initiate and complete the registration process. It should be used primarily by students unable to advance register, or students forced to change their advance registration. Because there is not extended time to communicate by mail (except perhaps for fee payment, if allowed after classes begin), all contacts must be made in person. Thus, this period is especially susceptible to long lines, and staff and student frustrations, as well as more staff-student personal contact. Computerized demand analysis is not practical, nor is computerized sectioning (unless on-line data entry terminals are available).

Open Registration Special Items

1. The process should allow for last minute changes in the Quarterly Schedule caused by student demands - in effect, manual demand analysis. This requires well-oiled communications between the students, schedulers and registrar personnel.

2. **In order to spread out the student load over the available time, it is recommended students register according to appointments or some predetermined time schedule.** For example, second year students A-M on the first day 8-10 A.M., second year students N-Z on the first day, 10 A.M. - 12:00 Noon, etc.
3. Because of the potential long lines problem, as well as others, some administrative person(s) should be designated to troubleshoot the entire process while it is in progress.

Late Registration

The third and smallest (measured by numbers of students) registration system is that which is allowed after open registration for some few days after classes have begun. The specific processes are usually exactly those of open registration, though perhaps more dispersed. (Not everyone is gathered together for example). For obvious financial and pedagogical reasons, such registrations are to be discouraged, but not disallowed.

It appears reasonable to set both a standard allowable time, and a standard penalty fee, for such registrations. The schools in Ohio now all differ in their treatment of these two standards.

The Task Force recommends that each school consider adopting the following policy:

1. **Late registration be allowed only through the first week of classes.**
2. **A late registration fee be assessed each student who registers or pays late.**

Registration Procedures

The registration procedures employed in the various community and technical colleges are similar when the essentials are examined. Differences are typically in the additional steps used or the mechanism employed to assist the process.

A typical pre-registration involves the following five steps.

1. Student completes pre-registration form with advisor
2. Class cards are pulled
3. Fees are paid
4. Registration form is prepared by the computer
5. Schedule is mailed to student

Open registration differs only in that the registration forms may be typed and the schedule given directly to the student.

A more involved examination of the registration process may reveal the following activities:

1. Student is checked for outstanding debts and given permits
2. Student presents registration permit
3. Student fills out master card
4. Student issued ID card
5. Registration packet given to student
6. Name imprinted on enrollment and fee card
7. Student sees advisor and selects courses
8. Student picks up class cards
9. Student completes registration packet
10. Registration personnel check packet
11. Business office assesses fees

12. Student pays fees
13. Registration cards sent to computer center
14. Student provided schedule of classes

Appendix 5.1 contains a flow chart of a registration process as well as a narrative of the process including all appropriate forms. The system is basically a card-oriented system for a small college. The source of the example registration system is the National Association of College and University Business Officers document entitled **A Student Records Manual.**

Aides to and Assistance for the Registration Process

Aides and assistance available for the registration process are numerous and for convenience can be categorized into at least four types:

- Data Entry Devices and Communication Methods
- Data Processing Equipment
- Systems Approach Advice and Help
- Application Systems Development

Data entry devices include optical scanners of mark sense codes, optical character recognition systems, embossed and holerith punched identification cards, teletypewriter, teleprinter or electric typewriter terminals, keyboard plus display terminals, optical scanning light pens, magnetic ink character recognition systems, holerith punched cards, punched paper tape, magnetic tape and written entries on hard copy. Communication methods include mail, telephone and remote terminals as well as traditional person-to-person contact.

Data Processing equipment available at most campuses includes central processing units for sorting and processing information, disk and tape units for temporary and permanent storage of information on files and line printers for preparing reports, schedules, form letters and billing information.

Currently no two universities in Ohio use the same set or combination of those items mentioned above though nearly all of them are used to some degree across the state in different facets of registration systems. To recommend one or more as being the best available, or even it should be used at all, cannot be done. Certain principles do hold true, however, when considering the use of such assistance in the registration process.

Properly designed and operated support devices and systems will help:

1. Reduce errors
2. Reduce duplication of entries
3. Reduce duplication of work
4. Handle large volumes of data speedily and accurately
5. Provide faster turnaround
6. Provide for automatic data edits
7. Provide for automatic data
8. Provide faster reports
9. Assist all parties to the process -- students, faculty, advisors, administrators and staff.

Systems approach advice and help for the registration process is available on most campuses within what might be referred to as the data processing and systems department. Many campuses use different titles for the department (i.e. Computer Services, Computer Center). The systems talent available in departments such as these can be an asset to the registration

process development especially at those larger community and technical colleges having the necessary staffs.

The involvement of a systems group in assisting the structuring of a registration process should begin at the planning level. **The planning effort should involve one or more formal meetings with the director of the systems department or his designee after the registrar has decided upon the future objectives of the registration process.** The purposes of these meetings are to elicit advice from systems regarding the alternative approaches to meet the objectives that are postulated by the registrar as well as to make it possible for systems to make suggestions or recommendations regarding the present or planned process. In most cases, the systems department will be capable of providing advice on the present and future capabilities of data processing equipment on campus, computer application being tried on other campuses, and information regarding the feasibility and costs of alternative approaches postulated by the registrar. However, more time and study of the present process may be required by the systems department if additional benefits are to be obtained. The amount of involvement of systems personnel in planning for the registration process should be related to the expectation of benefits achievable.

Discussions during the planning phase may indicate that an in-depth study of the registration process by the systems department is advisable. The outputs of such a study may include recommendations such as more advanced data gathering devices be utilized, that information collected be combined with other information for campuswide use, that demand analysis and terminal inquiry and entry be implemented during open registration, etc.

Based upon the results of the meetings with systems personnel the organization responsible for registration should include a computer services component in its long-range plan just as it presently includes a personnel component. The component of the plan should reflect the requirements for equipment and application software which the registrar feels are required to satisfy his needs. It should also include cost-benefit results that were derived based upon the discussions with the systems personnel.

In addition to advice and consultation provided by the systems department, data processing assists the registration process via development or acquisition of application programs and systems that automate and simplify the process. Examples include programs developed in order to accept mark sense codes and create course request files, process demand analysis, generate student schedules and fee payment statements.

6. Data Needs and Data Processing

Overview

The registration process generates a significant amount of student information that should be a vital component of the college's data base. The highly repetitive nature of the data recording and processing conducted during the student registration and class scheduling process provides many opportunities for the use of automated or computer-aided processing of data. Typical issues concerned with data collection and data processing are the amount of data which should be collected, the manner in which it will be used and the projected benefit from the costs expended. In the area of computer employment in the registration process, the issue concerns savings resulting from automation or the extent to which benefits will increase, in terms of the objectives of the registration process, for acceptable cost increments. This chapter will discuss the registration and scheduling relation to the data base, the use of computers in the process and the topics of pre-programmed packages and on-line registration systems.

Data Base Considerations

As institutions of higher education have grown, it has become apparent that the use of computer techniques in many of the administrative service areas benefited the schools by providing information for better decision making. This information, when properly applied in the decision-making process enables the school to more fully utilize its financial, faculty and facility resources in the educational process. Techniques for utilizing this data include institutional research, operations research, and other scientific management techniques.

Computers can be employed to record, manipulate, update, analyze and output data. Related data are collocated on files with five files making up a typical data base for a college:

- Student file
- Staff file
- Curriculum file
- Financial file
- Facilities file

When the college progresses from the use of day-to-day administrative data to the use of concise summaries, analyses and digests of volumes of administrative data, the college has developed what can be called a Management Information System (MIS).

Since the registrar's functions involve him with at least the first three data files above, he should be involved in the MIS planning and implementation. All MIS should be user driven, that is, information should be collected

that will be useful for management reports and not just for the sake of having all information centrally located. In the interest of efficiency each piece of data should be captured and stored only one time. This reduces storage requirements as well as guaranteeing that each user employs the same piece of data.

Computer Support of Registration and Scheduling

A natural question is, "when should a school change from a manual registration system to a computer-assisted system?" The obvious answer, which unfortunately turns out to be difficult to determine in practice, is when the computer's use is cost-effective. Cost-effectiveness analysis, or cost-benefit analysis as it is sometimes called, refers to a number of techniques for evaluating the effect of proposed changes in a system, and the expected costs of the changes. The analysis measures the additional worth of a change and compares it with the marginal cost of making the change. Cost-effectiveness should not be confused with cost savings since there are actually four criteria that can be satisfied to make a proposed change appear cost-effective.

1. **Lower cost, equal effectiveness** — The superior alternate is less costly than the others but equally effective.
2. **Equal cost, higher effectiveness** — The superior alternative is no more costly than the others but is more effective.
3. **Higher cost, higher effectiveness** — The superior alternate is more costly but it is also more effective. The increase in effectiveness is judged to be worth at least the increased cost.
4. **Lower cost, lower effectiveness** — The superior alternate is less costly but it is also less effective. The cost savings is judged to at least compensate for the reduced effectiveness.

If a budget is fixed, criterion 2 is appropriate. If increased effectiveness is necessary, criteria 2 or 3 are appropriate.

In applying the analytical technique, problems usually arise in defining the increased effectiveness and not so much in establishing the marginal costs. The effectiveness should be related to the objectives of the system under study (i.e. the registration system). Since the objectives are institutionally defined (one college wants to minimize student delays, another wants to maximize utilization of schools resources, etc.) the result of the analysis will be institutionally dependent. That is, one college will justify increasing computer assistance to the registration process while another college, in a similar financial situation, will not.

The best practice therefore is to conduct a cost/benefit analysis before expanding computer usage in the registration and scheduling process and make the final determination based upon institutional objectives.

Commercially Developed Registration and Scheduling Computer-Based Systems

Because of a number of changes that have occurred within the last few years (increased enrollments, attempts to minimize registration frustrations, more student involvement in course selection, comparisons of courses offered vs. requested), registration systems that are computer-based have become marketable goods. Both computer manufacturers and software firms have developed both generalized computer-based systems and series of computer modules that can be combined to satisfy an individual college's registration needs. Systems available from one software firm and one manufacturer

will be examined to illustrate the capabilities available. Selection of these two examples does not imply endorsement since no evaluation has been accomplished.

The Systems and Computer Technology (SCT) Corporation, based in West Chester, Pennsylvania, has developed a number of computer-based systems for various higher education clients in the areas of student registration, student scheduling and records systems. The previously developed systems and modules are summarized in what SCT calls a Library of College and University Systems (LOCUS). SCT claims that their modules were designed initially for higher education and thus are appropriate for non structured curriculum, for permitting students to make a preference for a particular course section and for allowing the schedule officer a variety of scheduling formulas.

The SCT Registration and Student Scheduling System consists of five modules:

- Course Schedule Maintenance Module
- Course Request Processing Module
- Student Scheduling Module
- Add/Drop Processing Module
- Student Billing Module

The **Course Schedule Maintenance Module** provides computer support associated with generating, updating and maintaining the course schedule. The module is also run to update the schedule based upon student demand.

The **Course Request Processing Module** builds and maintains a file of student course and course section requests and pre-processes, validates and reports on the results of such requests.

The **Student Scheduling Module** provides for complete computerization of the student sectioning and scheduling process and produces schedules, schedule statistics, tallies and class lists from the process. A number of different scheduling algorithms are available which permit course section preferences, alternate requests, free time and designation of priorities.

The **Add/Drop Processing Module** produces an audit trail showing the results of all add/drop transactions applied to the enrollment file, as well as section tally, section list and student list reports and new student schedules.

The **Student Billing Module** provides computer support to the student billing process and produces student fixed fees bills, supplemental bills and refunds based on program changes.

According to SCT literature, as of 1972 they had over 30 higher education clients for their various modules in registration and scheduling as well as admissions, alumni/development fund raising, budgeting and accounting. These previously designed systems allow SCT to minimize development costs and time yet allows for customized features according to each client's needs.

The IBM Corporation has a series of program packages available named EPIC, one of which is a computer-based student scheduling system called SOCRATES. The SOCRATES package of programs accomplishes the generation of the master schedule of classes, assignment of students to the master schedule classes and the update of these records with changes required to the assigned classes. The programs are distributed primarily in COBOL with some modules written in assembly language. The reports can be cus-

tomized by the personnel at the college. The package runs on a number of IBM machines. An IBM 1130 computer requires 16,000 words of core, a SYSTEMS 3 requires 32,000 bytes, and any 360/370 requires approximately 22,000 bytes in addition to that required for the operating system. The monthly lease for the package is $175.

As noted by IBM in their literature describing SOCRATES a number of carefully planned steps must be taken to assure the success of any previously written computer-based system.

1. Procedures must be thoroughly documented and understood by personnel involved.
2. Both a data processing systems person and an educator-coordinator should be assigned to implement the computer-based system.
3. Personnel should be educated in advance.
4. There should be an easy transition to the computer-based system. This may necessitate parallel operation of both systems until the new method proves satisfactory.

On-line Computerized Registration Techniques

As with most administrative applications that are computer automated, a question may arise regarding the advisability of an on-line computer assisted registration system. The justification for on-line systems is usually difficult to prove since the advantages that an on-line operation can provide are often difficult to measure. These advantages typically include:

1. An on-line system usually provides more up-to-date information to the user.
2. An on-line system usually provides more accurate information to the user.
3. An on-line system provides the user with a faster response.
4. An on-line system generally improves the management control function.
5. An on-line system can reduce the clerical staffing needs of user organizations.

Against these advantages must be balanced the associated costs — costs of additional computer equipment (terminals, internal core, on-line storage), additional computer services staff and/or skills, and retraining of the staffs of the registrar and similar offices.

Experiences at some of Ohio's schools indicate that one additional cost associated with on-line registration systems is the necessity to run the manual registration system in parallel with the on-line system for a certain period of time. This back-up system is required for so long as the possibility exists that the on-line system will become inoperative.

To illustrate what is involved in a typical on-line registration system, the Student Registration System (SRS) jointly developed by IBM and William Raney Harper College in Michigan will be examined. The college, which opened in 1968, has had substantial growth to an enrollment of about 9,000 students in 1972. The college is totally committed to on-line registration for all phases of the process including updating and drop and adds.

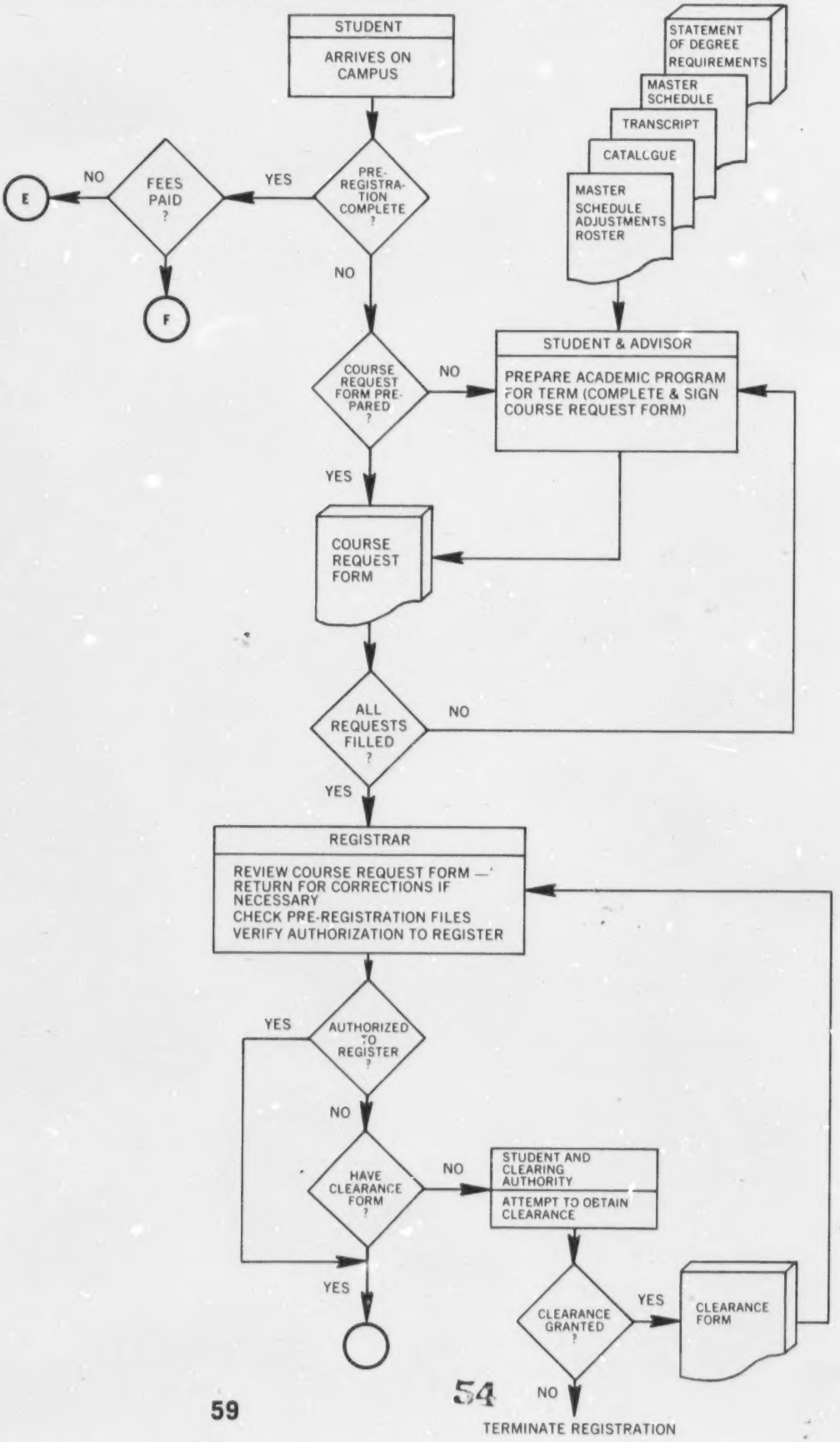
The SRS is designed to perform student registration functions, normally in the presence of the student, and to simultaneously create and/or update all necessary records. The SRS provides the ability via display terminals to add new classes, withdraw classes, display class lists, automatically calcu-

late fees, check for time conflicts or multiple enrollments, seats remaining and about 200 other user-defined registration restrictions. To accomplish this SRS requires approximately 35,000 bytes of core as well as another 12,000 bytes for the operating system. In order for the computer to process other jobs concurrently with the SRS about 64,000 bytes of core are necessary. This amount of core would provide less than one-second response time for up to eight terminals. In addition to the core and terminals, the system would require dedicated tape or disk files, the size of the files dependent upon the number of registering students. To these hardware requirements must be added the recurring costs for staff specialists for this program, as well as for on-line expertise.

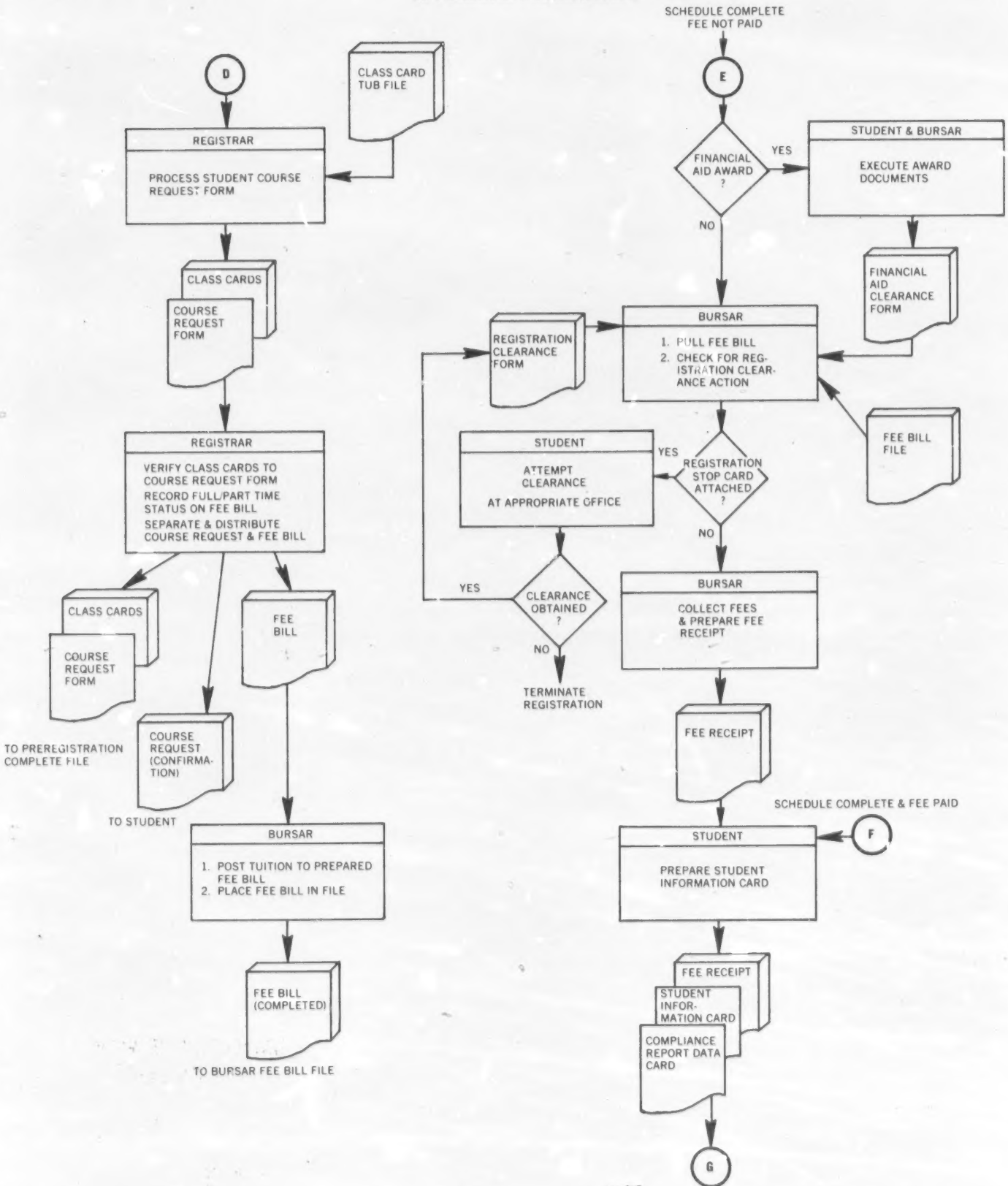
The SRS on-line registration system is typical in its rather severe requirements for computing resources. For this reason it is doubtful that any but the very large community or technical colleges would consider on-line registration and conclude that it is cost-effective for their college.

Appendix 5.1

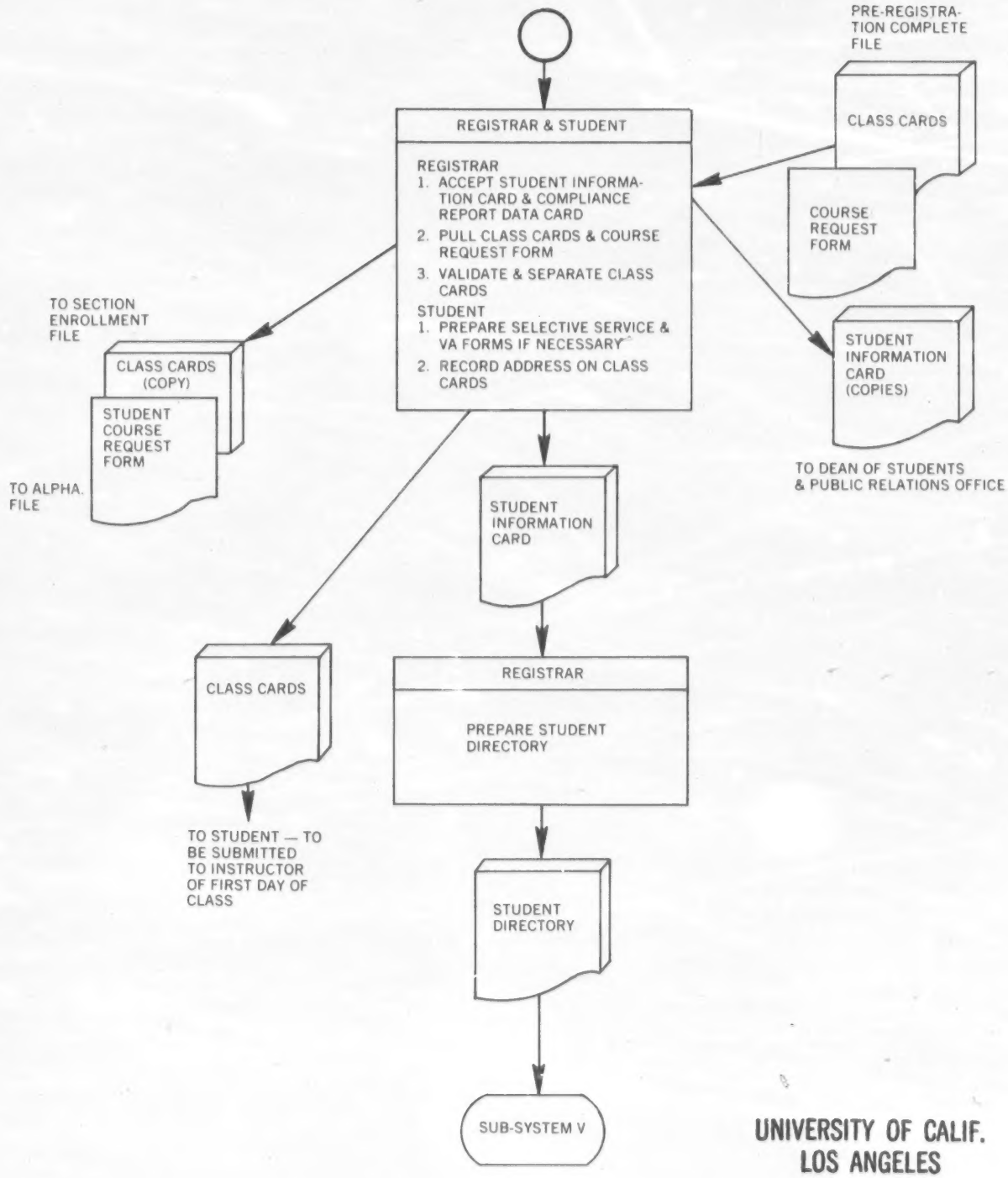
FLOW-CHART OF CARD-ORIENTED REGISTRATION SYSTEM FOR A SMALL COLLEGE



APPENDIX 5.1 (Continued)



APPENDIX 5.1 (Continued)


PRE-REGISTRATION COMPLETE FILE
CLASS CARDS
COURSE REQUEST FORM
REGISTRAR & STUDENT
REGISTRAR
1. ACCEPT STUDENT INFORMATION CARD & COMPLIANCE REPORT DATA CARD
2. PULL CLASS CARDS & COURSE REQUEST FORM
3. VALIDATE & SEPARATE CLASS CARDS
STUDENT
1. PREPARE SELECTIVE SERVICE & VA FORMS IF NECESSARY
2. RECORD ADDRESS ON CLASS CARDS
TO SECTION ENROLLMENT FILE
CLASS CARDS (COPY)
STUDENT COURSE REQUEST FORM
TO ALPHA. FILE
STUDENT INFORMATION CARD (COPIES)
TO DEAN OF STUDENTS & PUBLIC RELATIONS OFFICE
STUDENT INFORMATION CARD
CLASS CARDS
TO STUDENT — TO BE SUBMITTED TO INSTRUCTOR OF FIRST DAY OF CLASS
REGISTRAR
PREPARE STUDENT DIRECTORY
STUDENT DIRECTORY
SUB-SYSTEM V

UNIVERSITY OF CALIF.
LOS ANGELES

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